

# Important Advances in Clinical Medicine

## *Epitomes of Progress — Preventive Medicine and Public Health*

*The Scientific Board of the California Medical Association presents the following inventory of items of progress in preventive medicine and public health. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist the busy practitioner, student, research worker or scholar to stay abreast of these items of progress in preventive medicine and public health which have recently achieved a substantial degree of authoritative acceptance, whether in his own field of special interest or another.*

*The items of progress listed below were selected by the Advisory Panel to the Section on Preventive Medicine and Public Health of the California Medical Association and the summaries were prepared under its direction.*

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### **Vinyl Chloride-Related Cancer**

VINYL CHLORIDE MONOMER is a widely used chemical. It is the parent compound of polyvinyl chloride (PVC), a plastic resin used in innumerable consumer and industrial products, including containers, wrapping film, electric insulation, pipelines, credit cards and many other items. Notwithstanding its many valuable properties, overwhelming scientific evidence now shows vinyl chloride to be carcinogenic to humans. Moreover, medical evidence suggests a strong association between exposure to vinyl chloride and the occurrence of a number of toxic, nonmalignant illnesses involving skin, bones, liver, lungs and blood. Polyvinyl chloride (PVC) and other vinyl chloride polymers are not, at the time of this writing, considered to represent a carcinogenic risk to man.

First produced commercially in the United States in 1927, vinyl chloride gas was for many years regarded by toxicologists as having only moderate liver toxicity. It was once considered for use as a general anesthetic, but its use for this purpose was abandoned in the early 1930's after experiments in animals showed that its anesthetic effects were often accompanied by cardiac irregularities.

Major nonmalignant effects clearly associated

with occupational exposure to the gas include acute intoxication; disturbances of liver function; acroosteolysis, often with Raynaud phenomenon and scleroderma, and alterations in pulmonary function, with or without abnormal findings on x-ray studies of the chest. Other effects, such as alterations in the cellular elements of the blood, have been reported by some authors in persons who work with vinyl chloride, but confirmation by other authors has not been uniform.

There is some evidence that in workers exposed to vinyl chloride there may be an increased frequency of chromosomal aberrations. It has been alleged that in wives of men who work with vinyl chloride there may be a greater than usual fetal death rate and that mothers living in communities near PVC production facilities may be at an increased risk of giving birth to children with birth defects. It must be emphasized that, at the time of this writing, a causal relationship between vinyl chloride exposure and these latter phenomena—excess fetal death rate and birth defects—is not only unproven but is the subject of serious scientific dispute.

In January 1974 Creech and Johnson reported three cases of angiosarcoma of the liver in workers employed in a polyvinyl chloride polymerization plant in Louisville, Kentucky. Angiosarcoma

is a malignant tumor composed of neoplastic endothelial cells. It is also known by the synonyms hemangiosarcoma and malignant hemangioendothelioma. The tumor may originate in organs other than the liver, although at the time of this writing, all reported vinyl-chloride-associated angiosarcomas appear to have originated in the liver. This type of tumor has been considered to be extremely rare, appearing at a rate of only 0.05 to 0.2 new cases per million population (25 to 30 new cases reported in the United States each year). Consequently, it became immediately apparent that the Louisville cluster of cases was unlikely to be due to chance and further studies were undertaken by Creech and Johnson as well as other investigators. As a result of these studies, which included studies in other groups of people working with vinyl chloride as well as experimental exposure to laboratory animals, vinyl chloride was strongly implicated as an agent capable of causing angiosarcoma of the liver in both humans and experimental animals. By December 1975 a total of 45 cases of angiosarcoma of the liver had been discovered throughout the world, and many more have been reported since then. In practically all of them there has been documented occupational exposure to vinyl chloride.

In addition to angiosarcoma of the liver, exposure to vinyl chloride has been found to be associated with an excess of other types of cancer. An excess of liver and biliary cancer was shown in one study, although similar epidemiologic studies of workers exposed to vinyl chloride have not verified these findings. There have been isolated case reports of liver cancer occurring in persons with possible environmental exposure, such as neighborhood or household exposure, but because liver cancer is not so rare as angiosarcoma of the liver, these findings are only suggestive. A number of studies have found an excess of central nervous system tumors in workers exposed to vinyl chloride, when compared to United States population figures. The type of central nervous system tumor most often associated with vinyl chloride exposure is glioblastoma multiforme. Several epidemiologic studies have found an increased risk of cancer of the lung in those who work with vinyl chloride. However, since other studies have failed to confirm this finding, a causal association between vinyl chloride and lung cancer must, at this time, remain suggestive rather than conclusive. Several studies have shown an excess of cancer of the lymphatic

and hematopoietic systems in workers exposed to vinyl chloride. One major study suggested that the increased risk is for lymphoma rather than for leukemia. In summary, it may be said that angiosarcoma of the liver remains the type of cancer most clearly identified with exposure to vinyl chloride. However, cancer of other sites may eventually be added to the list of accepted vinyl chloride-related malignant conditions.

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#### REFERENCE

Creech JL Jr, Johnson MN: Angiosarcoma of liver in the manufacture of polyvinyl chloride. *J Occup Med* 16:150-151, Mar 1974

### Essential Hypertension, 1979— Where Do We Go From Here?

THE POSITIVE ASSOCIATION between the level of blood pressure (both systolic and diastolic) and mortality is no longer in dispute. Nor is there any argument about the efficacy of antihypertensive treatment. What needs emphasis is the fact that the rate of mortality associated with hypertension is numerically related to the level of blood pressure, even in the range not considered extreme (for example, diastolic blood pressure of 85 to 90 mm of mercury).

Control of hypertension poses two problems for practicing physicians. The first is attitudinal. Patients must be convinced of the necessity for a lifelong commitment to treatment, and thereby be motivated to comply with the prescribed regimen. One of the most important reasons for failure to control hypertension is noncompliance by patients. Ironically, the underlying cause of noncompliance is, in most cases, attitudinal and not drug-induced side effects.

The second problem is the sheer magnitude of the hypertension problem. Prevalence of hypertension in the United States is 18 percent in whites and 38 percent in blacks. About 42 percent of excess deaths attributable to hypertension occur among persons with diastolic blood pressure in the range of 90 to 100 mm of mercury who are by and large asymptomatic and may not even seek medical care. This makes hypertension a public health problem in addition to being a problem in the daily practice of medicine.

Control of hypertension in the community must be based on a creative partnership among all members of health professions so that a serious program of control can be organized for the benefit of the community as a whole. Such a pro-